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Total Number of Pages in This Submission

9

Application Number

09/187,551

Filing Date

November 5, 1998

First Named Inventor

Musaka, Katsuyuki

Art Unit

1762

Examiner Name

Marianne Padgett

Attorney Docket Number

AM524R/T289

## ENCLOSURES (Check all that apply)

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Remarks

The Commissioner is authorized to charge any additional fees to Deposit Account 20-1430.

## SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name

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Printed name

Chun-Pok Leung

Date

June 10, 2005

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41,405

## CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop Appeal Brief - Patents, Assistant Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below.

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PATENT  
Attorney Docket No.: AM524R1/T289  
TTC No.: 016301-028900

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of:

KATSUYUKI MUSAKA *et al.*

Application No.: 09/187,551

Filed: November 5, 1998

For: METHOD FOR FORMING A  
THIN FILM FOR A  
SEMICONDUCTOR DEVICE

Examiner: Marianne Padgett

Art Unit: 1762

**APPELLANT'S SUPPLEMENTAL  
REPLY BRIEF UNDER 37 CFR §  
1.193(b)(1)**

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**Mail Stop Appeal Brief - Patents**  
Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

In response to the Examiner's Supplemental Answer mailed on April 11, 2005, Applicants respectfully request the Board of Patent Appeals and Interferences to consider the remarks in this supplemental reply brief pursuant to 37 CFR § 1.193(b)(1).

ISSUE:

On July 31, 2003, the Board of Patent Appeals and Interferences issued a Remand to the Examiner for a determination of whether the rejection under 35 U.S.C. § 251 remains appropriate in view of *Ex parte Eggert*. If the Examiner determines that the rejection under 35 U.S.C. § 251 remains appropriate, the Examiner is authorized to prepare a supplemental Examiner's Answer specifically addressing the § 251 rejection of claims 27-29 and 31-33.

On April 11, 2005, the Examiner mailed the Supplemental Answer.

LEGAL STANDARD:

Under *Eggert*, the application of the recapture rule involves the following:

1. determine whether and in what aspect the reissue claims are broader than the patent claims;
2. determine whether the broader aspects of the reissue claims relate to surrendered subject matter; and
3. if there has been a surrender, determine whether the reissued claims are materially narrowed in other aspects to avoid the recapture rule.

The Board rejects a *per se* rule that a reissue claim which omits a limitation relied upon to overcome a prior art rejection in prosecuting the patent is always impermissible under the recapture rule. Instead, the Board applies a fact-specific analysis set forth in *In re Clement*, 45 U.S.P.Q.2d 1161, 1165 (Fed. Cir. 1997). "In *Clement*, 131 F.3d at 1468, 45 USPQ2d at 1163-64, the Federal Circuit stated that, while an attorney's failure to appreciate the full scope of the invention qualifies as error under § 251 and is correctable by reissue, the recapture rule 'prevents a patentee from regaining through reissue the subject matter that he surrendered in an effort to obtain allowance of the original claims.'" *Eggert*, at page 23. Citing *Hester Indus. Inc. v. Stein Inc.*, 46 U.S.P.Q.2d 1641 (Fed. Cir. 1998), *Eggert* reiterates that "*Hester* recognized that the recapture rule may be avoided in some circumstances where the reissue claims were materially narrowed in respects other than those in which the reissue claims were broadened." *Eggert* at page 29. Citing *Pannu v. Storz Instruments Inc.*, 59 U.S.P.Q.2d 1597 (Fed. Cir. 2001), *Eggert* emphasizes again that "*Pannu* clearly also leaves open the possibility that reissue claims which have been broadened in an aspect related to surrendered subject matter may avoid the recapture rule if they are materially narrowed in other respects." *Eggert* at page 30.

ARGUMENTS:

First, the reissue claims are broader than the patent claims in that they do not contain the limitations of forming a plasma "in a region above the substrate," "a fluorine-containing halocarbon gas selected from the group consisting of CX<sub>4</sub> and CX<sub>3</sub>-(CX<sub>2</sub>)<sub>n</sub>-CX<sub>3</sub> wherein X is hydrogen or halogen and n is an integer from 0 to 5 with the proviso that at least

one X is fluorine," and "at least about 2.5 atomic percent of fluorine." These features are highlighted in the following claim 1 in the issued patent 5,571,571:

1. A method of forming a conformal thin film of silicon oxide on a substrate having spaced conductive lines thereon comprising the steps of:  
mounting a substrate onto a substrate support in a vacuum chamber;

forming a plasma in the vacuum chamber **in a region above the substrate** by means of an electrical power source from a reaction gas comprising a mixture of tetraethylorthosilicate and a **fluorine-containing halocarbon gas selected from the group consisting of  $CX_4$  and  $CX_3-(CX_2)_n-CX_3$  wherein X is hydrogen or halogen and n is an integer from 0 to 5 with the proviso that at least one X is fluorine;** and

subjecting the substrate to the plasma so as to deposit a layer of silicon oxide containing **at least about 2.5 atomic percent of fluorine** onto the substrate without the formation of voids in the film.

Second, the broader aspects of the reissue claims relate to surrendered subject matter because they were added to overcome prior art rejections.

Third, a determination needs to be made as to whether the reissued claims are materially narrowed in other aspects to avoid the recapture rule. In this regard, the reissue claims are broader than the surrendered subject matter in some aspects, but narrower than the surrendered subject matter in others. The narrower aspects are highlighted in the following reissue claim 27:

27. A method of forming a layer of silicon oxide over a substrate having spaced conductive lines thereon in a process chamber, the method comprising:

introducing a selected process gas comprising tetraethylorthosilicate and **oxygen** into the process chamber;

**adding a flow of a halogen source to the selected process gas at a flow rate previously determined to achieve a desired stress in the layer from a plasma enhanced reaction of the selected process gas and the flow of**

**the halogen source at the flow rate, the desired stress in the layer being a tensile stress instead of a compressive stress in another layer formed from another plasma enhanced reaction of the selected process gas without the flow of the halogen source; and**

**forming the layer with the desired tensile stress from the plasma enhanced reaction of the selected process gas and the flow of the halogen source at the flow rate.**

The Examiner makes two arguments: (1) the reissue claims are not narrowed as compared with the surrendered subject matter, or (2) were narrowed as compared with the surrendered subject matter only in areas not related to (not germane to) what was surrendered.

In the first argument, the Examiner alleges that the narrowed aspects are inherent in the claims that were finally rejected (by virtue of the inclusion of "fluorine" in the claims) and in the claims rejected in the first action (by virtue of the inclusion of "halogen" in the claims). MPEP 1412.02 states that "if the narrowing limitation is incidental, mere verbiage, or would be inherent even if not recited (in view of the specification), then the claims should be rejected under 35 U.S.C. 251."

In this case, even assuming *arguendo* that the change of the stress (being tensile instead of compressive) in the layer were inherently related to the fluorine concentration, the formation of a layer at the flow rate selected to produce a tensile stress instead of a compressive stress in the layer would still not be incidental, mere verbiage, or inherent. Rather, the formation of a layer having a tensile stress by selecting an appropriate flow rate of the halogen source has a material aspect to it that was not previously surrendered or deliberately canceled and was not inherent in the previously examined claims.

*The Examiner's rejection appears to be predicated on her belief that the arguments concerning the various stresses do not make sense, and that the Declaration of Musaka is contradicted by the specification.* The Examiner's position is untenable. As stated in the Declaration of Musaka, ¶ 6, Fig. 13 of the present Patent Application shows a reduction of the magnitude of the stress (which is compressive) of about  $-1.25 \times 10^9$  dyne/cm<sup>2</sup> at zero C<sub>2</sub>F<sub>6</sub> flow, with higher C<sub>2</sub>F<sub>6</sub> flow rates, where the stress changes from negative (i.e., compressive) to

positive (i.e., tensile) at about 450 sccm  $C_2F_6$  flow rate. There is no contradiction between the specification and the Declaration of Musaka.<sup>1</sup>

The Examiner's argument that it would appear Applicants are alleging that the issued claims utilize compressive stress while the reissue claims utilize tensile stress is unavailing. Applicants make no such allegation, and Applicants' argument does not lead to such a conclusion. The change of stress from compressive to tensile is inherent in the disclosure, which provides the basis for the reissue claims to pursue overlooked aspects of the invention. The formation of a layer at the flow rate selected to produce a tensile stress instead of a compressive stress in the layer, however, is not inherent in the issued claims. The mere recitation of fluorine does not encompass selecting a flow rate to produce a tensile stress instead of a compressive stress in the layer. The formation of a layer having a tensile stress by selecting an appropriate flow rate of the halogen source has a material aspect to it that was not previously surrendered or deliberately canceled.

The Examiner's second argument is that the reissue claims are narrowed as compared with the surrendered subject matter only in areas not related to (not germane to) what was surrendered, by asserting that the limitations presently added are not related to "(1) the halogen source being fluorine, (2) the fluorine source being  $CX_4$  or  $CX_3-(CX_2)_n-CX_3$  and (3) the minimum fluorine concentration being 2.5 atomic percent."

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<sup>1</sup> The Examiner continues to focus on her unfounded belief that it is impossible for the stress to change from compressive to tensile. This leads her to disregard the Declaration of Musaka who had over 13 years of industry experience and was involved in the experiments that led to the results presented in this application. Furthermore, the Examiner's belief also leads her to mischaracterize the disclosure, for instance, at page 8, line 21, to page 9, line 3. Claim 31 recites that the tensile stress is less than about  $0.4 \times 10^9$  dynes/cm<sup>2</sup> in magnitude. This is shown in Fig. 13 where the positive (i.e., tensile) stress is less than about  $0.4 \times 10^9$  dynes/cm<sup>2</sup> in magnitude. The compressive (i.e., negative) stress has a maximum magnitude of about  $1.25 \times 10^9$  dynes/cm<sup>2</sup> in Fig. 13. Thus, the Examiner's statement that all values on Fig. 13 are below  $0.4 \times 10^9$  dynes/cm<sup>2</sup> in magnitude is erroneous.

The Examiner argues that, unlike *Eggert* but similar to *Pannu*, the present claim subject matter completely omits a "critical relied-upon limitation." The Examiner places undue emphasis on this distinction because *Eggert* clearly states: "Accordingly, we decline to extract from the above-quote language in *Pannu* a generalized rule that a reissue claim which omits a limitation relied upon during prosecution of the patent application is *per se* impermissible under the recapture rule, regardless of whether the claim has been materially narrowed in other respect compared to the surrendered subject matter." *Eggert*, at page 31 (emphasis added). "Rather, we consider that the proper inquiry requires a fact-specific analysis in each case to determine whether the patentee is attempting to recapture by reissue subject matter that was surrendered during the prosecution of the patent application." *Id.*

The Examiner further asserts that both *Hester* and *Pannu* pointed out that one should look at the limitation relied upon to define the invention over the prior art, and determine if that limitation is omitted in the reissue claims. As discussed above, *Eggert* declined to extract a *per se* rule in view of *Pannu*. In addition, *Eggert* specifically points out that "citing *Mentor*, 998 F.2d at 996, 27 USPQ2d at 1525, *Hester* recognized that the recapture rule may be avoided in some circumstances where the reissue claims were materially narrowed in respects other than those in which the reissue claims were broadened." *Eggert*, at page 29. According to *Eggert*, "*Hester* leaves open the possibility that such reissue claims may avoid the recapture rule where they are materially narrowed in other respects." *Eggert*, at pages 29-30.

It is well settled that where a reissue claim does not attempt to protect the surrendered subject matter, it does not violate the recapture rule even though it may not include the substance of amendments that were made to gain allowance. *B.E. Meyers & C. v. United States*, 56 U.S.P.Q.2d 1110, 1116 (Ct. Cl. 2000). In that case, the reissue claims omitted the "pulsing diode and substantial pulsing current limitations" that were used to distinguish over the prior art in the issued patent. *Id.* at 1115. Instead, the reissue claims added limitations directed to a lens apparatus. *Id.* at 1116. "The subject matter protected in the new independent reissue claims dealt only with the lens system; it had nothing to do with any type of pulsing circuitry." *Id.* The reissue claims presented "a separate invention eligible for patent protection, independent of whatever type of pulsing circuitry might be used in combination with the lens system in any

particular device." *Id.* The court found no violation of the recapture rule, and provided the following reasoning:

During the original patent prosecution, the examiner made plaintiff aware that it could not receive protection for its basic pulsing circuit design because such pulsing circuitry was already taught by the prior art. In this regard, nothing changed after the reissue process. Plaintiff still cannot rely on its reissue claims to protect any type of pulsing circuit design that is taught by the prior art, and therefore plaintiff has not used the reissue process to [improperly] recapture subject matter surrendered during the original prosecution.

This case is analogous to *B.E. Meyers*. Claims 27-29 and 31-33 do not attempt to protect the surrendered subject matter. During the original patent prosecution, it was clear that no patent protection was available for a process of depositing a high quality layer of silicon oxide without the formation of voids in the film by introducing into the plasma a reaction gas comprising a mixture of tetraethylorthosilicate and a preselected halogen-containing gas. In this regard, Applicants are not using the reissue process to improperly recapture this subject matter that was surrendered during the original prosecution. Rather, the reissue claims are directed to a separately patentable aspect of the invention. More specifically, independent claim 27 recites adding a flow of a halogen source to achieve a desired stress in the layer which is a tensile stress instead of a compressive stress that would otherwise result without the flow of the halogen source. These claimed features are directed to a separate invention eligible for patent protection, independent of the specific type of fluorine-containing halocarbon gas and specific atomic percent of fluorine in the issued claims.

Based on the facts of the present case, Applicants are not attempting to recapture by reissue subject matter that was surrendered during the prosecution of the patent application. Instead, the reissue claims are materially narrowed in other overlooked aspects of the invention. Applicants are merely attempting to obtain through reissue a scope of protection to which they are rightfully entitled for such overlooked aspects.

In sum, independent claim 27 includes a narrowing limitation not present in the claims deliberately canceled in the application and that the narrowing limitation has a material aspect to it that was not previously surrendered or deliberately canceled. Accordingly, the addition of claims 27-29 and 31-34 does not constitute recapture of subject matter surrendered in the application for the patent upon which the present reissue is based.

CONCLUSION:

In view of the foregoing, Applicants respectfully submit that the rejection of claims 27-29 and 31-34 under 35 U.S.C. § 251 is inappropriate in view of *Ex parte Eggert*.

Respectfully submitted,



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